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Institutional Logics and Critique in German Academic Science. Studying the Merger of the Karlsruhe Institute of Technology

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Abstract: *»Institutionelle Logiken und Kritik im deutschen Feld der Wissenschaft. Eine Untersuchung des Fusionsprozesses des Karlsruher Instituts für Technologie«.* This contribution looks into changing institutional logics in the field of academic science in Germany using the case of the merger between the University of Karlsruhe and the Research Center Karlsruhe as an example. As a result of an ongoing process of critique, a new institutional logic of "organizational competition" was theorized over time that contradicted the dominant logic of "corporatist planning." The conditions for the merger case were 1) an increasing alignment and cooperation between both organizations as an outcome of the public critique of big science research institutes, and 2) the rise of a new institutional logic of organizational competition including the organizational implementation of a new management model of science, notably the concept of the "entrepreneurial university" (e.g. the MIT in the United States). After the merger had been decided, political activities shifted from a projective "mode of theorization" to a pragmatic "mode of negotiation." The institutionalization of the new "Karlsruhe Institute of Technology" (KIT) was shaped by two competing logics: Whereas the state and the Helmholtz Society did not want to lose their influence, the new KIT was committed to the concept of the "entrepreneurial university" and thus to a higher degree of organizational autonomy and strategic management. The final outcome was a compromise built on a *layered structure* that combined pre-existing and new organizational structures.

Keywords: Institutional logics, critique, theorization, merger, higher education, sociology of science, organizational change.

1. Introduction

Many scholars studying academic institutions claim that marketization seems to turn universities and research organizations into strategic corporate actors with a high degree of organizational autonomy, competing for students, re-

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source funds, and recognition (Slaughter and Rhoades 2004; Krücken and Meier 2006). The German academic system has been typically described as a latecomer in that process (Schimank and Lange 2009). The reasons for this time lag are usually attributed to the high degree of multilevel governance and strong academic self-administration in the German science system (Hornbostel 2001; Knie and Simon 2010). From a governance perspective, this institutional change results from intended and unintended effects of research performance and academic autonomy (Jansen 2010a; Whitley, Gläser and Engwall 2010; Boer, Enders and Schimank 2007; Münch 2006).

In contrast to the governance perspective, the institutional logics approach takes into consideration that multiple rationalities may compete within a field, especially in unsettled periods of turbulent change. The term *institutional logic* refers to the cultural models and organizing principles that define how resources, organizations, and individuals are ordered in a focal field of study (Thornton, Ocasio and Lounsbury 2012). Two competing institutional logics characterize the academic scientific field in Germany: Firstly, the *institutional logic of corporatist planning* emerged after World War II in order to handle the massive expansion of higher education, on the one hand, and organize nuclear research, on the other hand. This logic was driven by the insight that education and science are crucial for economic success and prosperity. It involved a high degree of labor division and segmentation in both the university and the non-university sector. Over the past decades, this institutional order has increasingly come under pressure by the growing influence of an *institutional logic of organizational competition*. This logic shifts the focus to the organizational level of universities. They are seen as the primary locus of managing the relationships between researchers, industry, governments, and students. The question arising from this schematic description is: *Why has the institutional logic of corporatist planning shifted to the logic of organizational competition?* Put differently, how did the principles of competition, quality, and transparency, which were articulated in the discourse, become relevant for action?

In order to understand this shift in institutional logics in the academic field, this contribution builds on a single case study, namely the merger of the Technical University of Karlsruhe and the Research Center Karlsruhe (member of the Helmholtz society). In the course of the first round of the so-called German Excellence Initiative, both organizations established together the Karlsruhe Institute of Technology (KIT). From the perspective of the "old" logic of corporatist planning, this merger is a deviant case (Rueschemeyer 2008) that many observers had estimated to be highly unlikely and unique. Whereas universities are financed and regulated by the German *federal states*, the research institutes of the Helmholtz society mostly (90%) depend on the national government. A merger of two differently regulated and funded organizations seems to be highly complicated and very difficult to realize. This case can only be understood within the new logic of organizational competition: The KIT was the result of a

voluntary merger[1] initiated by the two organizations themselves in the course of the first round of the German Excellence Initiative. It was even designed in order to overcome the high degree of segmentation within the academic field. The second research question that arises from the case study is *how the two competing logics have influenced the merger process*. What are the consequences of this organizational change?

This paper is subdivided into five parts: The first part develops a theoretical model for the analysis of institutional logics in academic science. The second part introduces the methodology of process-tracing. The qualitative analysis of the process is analytically structured by two theoretical constructs: critical junctures and critique. The third part presents the changing institutional logics in German academic science from a field perspective. The fourth part studies the decision and outcome of the KIT merger process. The fifth part draws some conclusions concerning the role of critique for the emergence of institutional logics.

2. The Institutional Structures of Academic Science

From *the macro-sociological perspective* of differentiation theory, science, economy, politics, or religion are viewed as "societal subsystems" or "value spheres" (Weber) where each sphere is dominated by its own "rationality" such as profit seeking (economy), striving for power (politics), and striving for salvation (religion) (Schimank 2015, 84). In this sense, the scientific subsystem provides the norms and values that define the scientific ethos of "truth." Earlier studies stressed the institutional prerequisites (such as universalism, communism, disinterestedness, and organized skepticism) for the autonomy of science (Merton 1974). Accordingly, the dynamic of the science system is shaped by a "functional antagonism" that confronts the self-referential orientation towards "curiositas" with expectations from politics and society (Schimank 2015, 89). Differentiation theories maintain that the scientific value sphere is structured by a conflict over the question whether and how external or self-referential aspects of the production of services and goods should be considered (Schimank 2015, 83).

This institutional paradigm of the sociology of science has been criticized by the *microsociological approach* which argues that the

> Mertonian norms […] are formulated at such a general level that they appear to be common to the whole academic community. They are, therefore, open to great variety of interpretations. (Mulkay 1977, 105)

[1] Over the last forty years, several German universities and smaller institutions had merged, but these mergers were initiated or even forced by the *Länder* (federal states) governments mostly for rationality and efficiency reasons (Pruisken 2014).

A major insight devolved from this research agenda to the sociology of science is the cultural "disunity of the sciences" (Knorr Cetina 2009, 2): The behavior of scientists is much more determined by disciplinary differences and epistemic cultures than by subsystem-specific norms and rationalities (Knorr Cetina 1992). If scientists are always truth-seeking, skeptical, and disinterested people, how is resistance towards innovation and new knowledge possible (Mulkay 1969)? Consequently, the process of scientific knowledge production should be conceived as underdetermined and contingent: "There are no absolute – and at least no empirical – criteria that decide whether a hypothesis is true or not" (Heintz 1993, own translation).

What can be concluded from both contradicting paradigms is that the scientific value sphere, on the one hand, and research practices, on the other hand, are mediated by a wide range of structures at the meso-level. "Scientific truth" is a value and therefore a rather metaphysical category that can only be "phenomenalized through practice" (Friedland et al. 2014, 335). What makes science distinctive from other social areas are the discipline-specific measures and procedures that ensure scientific quality (Weingart 2010, 124). Against this backdrop, three kinds of intermediating structures can be compared 1) disciplines, 2) scientific communities, and 3) organizations. These institutional elements specify the ways and strategies of how scientific quality or excellence can be reached (Lamont 2009). *Disciplines* are "the primary unit of internal differentiation of the modern system of science" (Stichweh 1992, 4). They are institutionalized at universities (as roles of professors and departments) and within academic professional associations. Disciplines may embrace several scientific paradigms shared by *scientific communities* (Kuhn 1972; Stichweh 1992).

Finally, scientists work in and are influenced by various forms of *organizations* (universities, research institutes, funding agencies) that organize, control, direct, fund, and regulate research activities in many ways (Braun 1993). Their research is also financially dependent on external givers (state, economy, civil society) and therefore relies on additional sources of legitimation (Schwinn 2009, 58). In particular, nation states have started to found organizations and programs to realize their goals and ideas since the 20th century (Stichweh 2013, 138). As comparative studies have further shown, the entanglement of scientific disciplines, communities, organizations, and the state differs considerably from one country to another.

The concept of institutional logics grasps the link between narratives (Elzinga 2012), self-descriptions (Kaldewey 2013), or "imaginaries" (Jasanoff and Kim 2009) and action-oriented "scripts" that guide the attention at the level of research groups, university presidents, or science managers and captures how values, practices, and regulatory rules are interrelated. Thornton and Ocasio define institutional logics as

> the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their

> material subsistence, organize time and space, and provide meaning to their social reality. (Thornton and Ocasio 1999, 804)

In the field of academic science, institutional logics define how academic researchers, instruments, scientific practices, organizations, disciplines, scientific communities, and the state are ordered.

In this sense, Lepsius describes the differentiation of a new order analytically as cognitive isolation of a value (Lepsius 1990, 35). Firstly, the value is translated into "rationality criteria" (such as standards, rules, and procedures) that systemize actions and make them predictable and intersubjectively controllable. Secondly, the rationality criteria are applied to a specific scope of action. The process of institutionalization includes not only the rationalization of a value, but also the definition as to when, for whom, and in which contexts it should be applied. Thirdly, the new order needs to be established against other contradictory orders, e.g. through sanctions (Lepsius 2013, 15). In contrast to the governance perspective, Lepsius underlines that action is consistently oriented towards an envisioned order. This perspective turns attention towards the process of institutionalization in which critique plays an essential role – as this study will show.

3. Methodology

How can the profound shift of the German research system towards organizational competition be explained? In order to understand this process from a micro-, meso-, and macro-perspective, I conducted a case study on the merger of the University of Karlsruhe and the Research Center Karlsruhe. Discourse analytical studies have shown that competition and efficiency have been an increasingly important issue in Germany ever since the 1980s. As early as in 1985, the German Council of Science and Humanities (*Wissenschaftsrat*) has published a recommendation formulating a new role model for the university based on quality, efficiency, performance, evaluation, and competition (Wissenschaftsrat 1985; Bartz 2007a, 132). Nevertheless, these recommendations did not have any institutional effects until the mid-1990s, when the German federal states started to reform their state laws and the Council of Science and Humanities began to evaluate extra-university research organizations.

In order to identify the causes for the shift from the institutional logic of corporatist planning to the logic of organizational competition, this study retraces the history of the KIT merger case. By applying process-tracing as a method of qualitative research, we can study how events are causally interrelated in sequences (Beach and Pedersen 2013; Bengtsson and Ruonavaara 2017; Aljets and Hoebel 2017; Kern and Laux 2017 in this volume). Sequencing is a method that helps to identify chain-linked events. In order to study the sequences that led to the KIT merger, it was necessary to trace back the sequences of different length and "scales of observation" (Desjeux 2008; Aljets and

Hoebel 2017). The use of different scales allows studying the nesting of organizational change into broader field change (Gray, Purdy and Ansari 2014). Three scales of observation are distinguished: In order to capture the macro-level of the field, science policy literature and documents were examined. At the organizational level of the Research Center Karlsruhe and the University of Karlsruhe annual reports and concepts were analyzed as written outcomes of the process. To study the individual perceptions and interpretations of the actors involved, 20 interviews with members of the leadership teams of both organizations were conducted (Pruisken 2014, 139-47). The interviews were conducted in 2008 and 2009, when the first round of the German Excellence Initiative (see below) had already been decided by science policy makers. At that time, the merger was in process and the concepts of how to establish and structure the new KIT had already been produced. The data was analyzed and coded according to two broader categories: critical junctures and critique.

Organizational mergers are often nested in field change. External "shocks" such as social upheaval, technological innovations, scientific discoveries, or regulatory change are assumed to destabilize existing practices and rules and produce a high degree of uncertainty (Greenwood, Suddaby and Hinings 2002, 60). These changes usually enable the entry of new players and "institutional entrepreneurs" (Maguire, Hardy and Lawrence 2004). Research on mergers and acquisitions has shown that merger waves are often a result of such jolts or shocks (Stearns and Allan 1996). This research also indicates a causal relationship between external events, on the one hand, and organizational transformations (such as mergers), on the other hand. Events can be understood as temporal isolable units that can be extracted from societal change due to their importance for future developments (Aljets and Hoebel 2017, 8). In this sense, Mahoney understands critical junctures as "choice points when a particular option is adopted from among two or more alternatives" (Mahoney 2001, 113). Critical junctures are structured by open dynamics of conflict in which several options can be selected. But, as Mahoney argues, "once a particular option is selected, it becomes progressively more difficult to return to the initial point when multiple alternatives were still available" (2001, 113). Nevertheless, only those choice points should be considered critical junctures "that close off important future outcomes" (2001, 113). These future outcomes are characterized by a high degree of self-reproductivity and path dependency.

Critical junctures can be understood as a period of unsettled and open disputes that are concerned with the interpretation of the situation. The "recognition that the concrete particular situation at hand is somehow ambiguous, unsettled or unresolved" (Emirbayer and Mische 1998, 998) is necessary for the prevalence of a critical juncture. In this situation principles and schemas from the past have to be (re)activated, deliberated, decided and subsequently executed. Actors thereby rely on "cultural logics of coordination" (Diaz-Bone 2015, 21) understood as orders of justification (Boltanski and Thévenot 2006). This is

due to the fact that "justifications have to follow rules of acceptability" (Boltanski and Thévenot 1999, 360). Not every argument can be usefully applied in every social context, but it has to be tested and proved. Therefore an already existing and proven frame of analysis has to be tackled by the critic. Eventually the arguments given have to be brought into an agreement or compromise in order to solve the dispute. A principle of equivalence is needed that brings objects, people, and their connections into an order.

Beside pragmatic critique, critical junctures may also be influenced by rather *projective forms of critique* (Emibayer and Mische 1998). Hence, actors do not only repeat habits from the past, but also imagine and invent future possibilities through framing and theorization. Alternative solutions for a given (criticized) problem are hypothesized. In many cases scientific breakthroughs such as nuclear technologies, nano- and biotechnologies have led to a new "sociotechnical imaginary" defined as "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects" (Jasanoff and Kim 2009, 120). The process of relating arguments and making a compromise can be grasped by the concept of theorization, by which Strang and Meyer "mean the self-conscious development and specification of abstract categories and the formulation of patterned relationships such as chains of cause and effects" (Strang and Meyer 1993, 492). Theorization includes two central features: the specification of general organizational failing, on the one hand, and the justification of abstract possible solutions, on the other hand (Greenwood, Suddaby and Hinings 2002, 60).

4. Changing Logics in German Academic Science

4.1 The Institutional Logic of Corporatist Planning (1950s-1980s)

In this section, two sequences are presented that describe the emergence of an institutional logic of corporatist planning. This logic is characterized by a high degree of *governmental power and authority*. However, in Germany this power has been traditionally divided between the federal states and the national government (Braun 1997, 26). Over time, a strong institutional boundary between universities and research institutes has emerged as an outcome of a political conflict between these two autonomous policy levels. Ever since the 1950s, the impression that academic science and research are crucial for the national competitiveness and cultural development has increased across all Western nation states (Drori et al. 2003, 2). Both the federal states and the national governments were therefore interested in corroborating their influence and access to scientific institutions. Within these negotiation systems, a high degree of trust and consensus emerged that led to the formation of four domains of research

("pillarization"): The Max-Planck-Society (and the universities) undertakes academic basic research, the Fraunhofer-Society is associated with industrial contract research, the Helmholtz Society provides state preventive research, and the Leibniz-Society performs thematic research (Hohn 2010, 460).

The overall idea of this system was a value chain covering the whole range from rather accidental academic inventions to technological applications. Therefore, the academic identity of individual researchers is not only shaped by scientific communities, but also by these specific organizational identities. The research styles between the different kinds of research organizations differ greatly. In addition, the German model is characterized by a strong focus on *academic self-governance*. The German universities and non-university research organizations were traditionally led by academic committees (e.g. the senate) that took all important academic decisions. Nevertheless, academic freedom is thought of as freedom *in* the state, rather than freedom *from* the state. The self-organization of corporate bodies takes place under the jurisdiction and supervision of the state (Braun 1997, 173). Therefore, legal certainty is a strong principle in German universities and research organizations.

Higher Education Expansion (1960s-1980s)

After World War II, the universities in Germany had to be rebuilt. Although this situation held the potential to become a critical juncture, the "old" governance that existed before 1933 was restored. The cultural sovereignty of the federal states as well as the freedom of science were codified in the constitution. Federalism led to the emergence of two policy levels that had to be coordinated. Until the 1970s, a variety of actors were created for that purpose: the Conference of Ministers of Education (KMK) in 1948, the Council of Science and Humanities[2] in 1957, and the Joint Conference of the National Government and the Federal States in 1970 (today: Joint Science Conference). The overall aim of these committees was to push forward plans for higher education expansion.

It is a popular narration that the so-called Sputnik-Shock (1957) – the fact that Russian scientists won the first round of the space race – created the insight that the scientific future cannot be built by a research elite, but needs a broader fundament of general education. Although this event hit the US-American national identity much more than the German one, within a few years' delay, a "national educational catastrophe" was also diagnosed in Germany. The two main proponents in this discourse were Georg Picht and Ralf Dahrendorf. Whereas Picht (1964) argued from a more economic perspective

[2] The Council of Science and Humanities is an advisory committee giving recommendations for the future development of the national science and higher education system. Members are scientists, state actors, and public persons.

that an educational crisis leads to an economic crisis, Dahrendorf (1965) emphasized the sociopolitical aspects of education, claiming for education as a civil right. The discussion subsequently initiated a process of institution-building in which the higher education landscape was transformed in an increasingly orchestrated and planned higher education system.

Influenced by the *Dahrendorf-Plan*, all federal states started to design plans for their higher education institutions. Different to former attempts at reforming the German higher education landscape, not only universities and technical schools,[3] but also engineering, educational and other seminaries were integrated into a comprehensive higher education system (Bartz 2007b, 161). The Dahrendorf committee also invented the idea of transforming all German universities into comprehensive higher education colleges (*Gesamthochschulen*). This idea was implemented in some federal states, but could not be fully institutionalized. Instead, a *division of labor* between academic universities and applied colleges (*Fachhochschulen*) was implemented. With the First German Higher Education Framework Act in 1976, the universities became increasingly similar among each other. This Framework Act was mostly organized and planned by the Joint Conference of the National Government and the Federal States. At that time, the number of students had risen from 85,949 in the winter semester 1948/49 to 658,204 in the winter semester 1972/1973 – thus it had increased by a factor of nearly 8 (*Statistisches Bundesamt*).

In this process, *Technische Hochschulen* were renamed as "technical universities." They integrated basic science as well as social sciences and humanities into their programs. In terms of organizational design, the technical universities adapted to the traditional universities and incorporated the value of academic freedom into their organizational structures: researchers are free to set their research lines. Nevertheless, the reason for the academization of the technical sciences did not only rest on higher education expansion. In addition, the substantial and methodological border between natural and technical sciences became clearer and the latter was viewed more and more as being a true aca-

[3] The institutionalization of Technical Universities started with the formation of polytechnical schools at the beginning of the 19th century. The Polytechnical School in Karlsruhe was founded in 1825. In the course of the growing industrialization, these schools institutionalized the idea that natural and engineering sciences should constitute a closed discipline on its own (Neumeier 2000, 11). From the beginning, polytechnical schools and universities were in conflict with the existing prestigious universities. But already in the middle of the 19th century, the polytechnical schools began to fight for equality with the universities. Engineers should become a profession equivalent to physicians and lawyers (Neumeier 2000, 16). Subsequently, in 1885, polytechnical schools were renamed "Technische Hochschulen" (technical schools or technical higher education institutions). Between 1899 and 1901, the technical schools were granted the right to award doctoral degrees, which meant the formal equalization with the universities.

demic science.[4] Although the technical universities today have the status of comprehensive universities, they still consider themselves to be different from the traditional universities (Interview 01). Accordingly, even if all universities were regarded as equal (but different from the colleges of applied sciences), there are still profound boundaries between organizational identities.

"Big Science" (1950s-1980s)

Large-scale research as an institutional form of research was initiated through the announcement of the "nuclear age."

> Atoms for peace was the promising slogan, indicating that Western industrial nations denying the atomic salvation would be seriously threatening their own and the whole West's economic prosperity. (Gleitsmann 2011, abstract)

An important element of sociotechnical imaginaries such as nuclear power is their *projective*, salvationist, and utopist (but at the same time secular) character – they claim to solve major problems threatening society and prepare for a better future. The theorized problem of the pro-nuclear power movement included that wealth, growth, and social peace depend on this new technology and that otherwise the country would fall back behind other Western "atomic" countries (Gleitsmann 2011, abstract). The theorized solution, on the other hand, was infused with fictional ideas of how nuclear power could save the world.

With the signing of the Paris Agreements in 1955, the Federal Republic of Germany received the sovereignty to conduct nuclear research and operate nuclear research centers (Ritter 1992, 61). This "regulatory jolt" led to a process of institution-building in the scientific and political field in Germany as well as in other countries. This situation could be conceived as a critical juncture because several ways of how to institutionalize nuclear technology, reactor development, and atomic energy were discussed between political actors,[5] industrial companies, and academic actors.[6] In this rather unsettled and open dispute, a variety of new collective actors such as commissions and councils were established and assigned to develop an agenda for research and development on nuclear energy (Hohn and Schimank 1990, 237-45).

The outcome of this contingent negotiation process was *that initially two Nuclear Research Centers were founded*; one of them being the Nuclear Research Center in Karlsruhe which is in the focus of this study. In the beginning,

[4] This process was underlined by the admission of some individual engineers into the Prussian Academy of the Sciences (Federspiel 2011, 28).

[5] The political actors involved were the Federal Chancellery, Federal Ministry of the Interior, Federal Ministry of the Economy, and Federal Ministry of Nuclear Power.

[6] The academic actors involved were the scientific community of nuclear scientists, the German Research Council, and the German Research Foundation.

the research center was funded by a joint venture consisting of different science policy actors, industrial companies, and a group of scientists from the Max-Planck-Institute in Göttingen. Especially the industrial partners supported an organizational design based on the model of industrial firms, while, in contrast, the scientists opted for an organizational solution that was similar to the Max-Planck-Institutes (Oetzel 1996, 308). Thus, in the founding years, the Research Center was shaped by competing ideas on how to organize research most effectively (Pruisken 2014, 213-7). However, when the representatives of the industry realized that their demands could not be established, they withdrew from the joint venture. As a result, the role of the national government which had to cover the increasing costs of the center *was considerably strengthened*.

During that time (1960s), the term "big science" emerged in order to describe a specific type of research. Accordingly, large-scale organizations should conduct research that was highly relevant for society. This vision was mostly promoted by Wolfgang Häfele (project leader of the "Fast Breeder Reactor" in Karlsruhe). Having visited *national laboratories* in the US, he clearly distinguished "big science" from the rather conventional project-driven type of science at universities (Oetzel 1996, 10; Hohn and Schimank 1990, 249). Hohn and Schimank highlight three characteristics of big science – understood as *rationality criteria* – that were defined during these times: Firstly, big science works on research topics that require an extraordinary amount of financial, instrumental, and personnel resources for a longer period of time. This was symbolized by the large equipment that the researchers worked on.[7] Secondly, big science integrates basic and applied science and covers – within the scope of projects – the whole process from basic modeling to technical development. Inasmuch as the research organization works on applied research, the choice of research topics and priorities is a political decision (Hohn and Schimank 1990, 251-2). Big science includes the idea that societal issues and problems are solved by big research institutes (or coordinated programs). Until the 1970s, big science research organizations were institutionalized in Germany as a large domain of the science system (Hohn and Schimank 1990, 254-7). In the 1950s, most of them were dedicated to nuclear research. Since the mid-1960s, the research topics have diversified. Consequently, the *scope of action* (Lepsius) for big science and, therefore, its degree of legitimacy was extended to other fields of research.

4.2 Critique and Critical Junctures (1990s)

The 1990s are considered the critical years during which new forms of research governance were introduced for the first time (Jansen 2010b). In this period,

[7] Examples are particle accelerators, nuclear reactors, meteorological stations, or rocket launch vehicles.

two critical junctures can be identified. Both of them have affected the German political system as a whole and the science system more specifically: firstly, the nuclear accidents of Harrisburg (1979) and later Chernobyl (1986) and, secondly, the German Reunification in 1989/90.

German Reunification and Change (1990s)

As early as in 1985, the German Council of Science and Humanities published a recommendation in which a new role model for the university based on quality, efficiency, performance, evaluation, and competition was formulated (Wissenschaftsrat 1985; Bartz 2007a, 132). The Council had realized a potential fall back of German universities compared to other nations (Bartz 2007a, 140). However, in contrast to other countries (e.g. Great Britain or the Netherlands), these recommendations were not followed by any institutional effect. At that time, the degree of academic self-governance at German universities was high and academic associations (German Association of University Professors and Lecturers and German Rector's Conference) were protecting their rights. In the literature this was described as a "non-aggression-pact" (Hornbostel 2001, 140).[8]

In this situation of institutional inertia, the German reunification forced the actors involved to restructure the Eastern German higher education and research system. This event constituted a critical juncture that opened up the opportunity to reorganize academic institutions (Mayntz 1994; Pasternack 2001, 2006). As an outcome of this process, East German organizations (universities, colleges, and research organizations) were incorporated into the West German academic system. The Council of Science and Humanities was engaged to evaluate the non-university research institutes of the German Democratic Republic (GDR) and to give recommendations concerning their future role in the German system. In addition, the Council developed recommendations for the future structure of higher education in the "new" federal states in East Germany (Stucke 2006, 251). These recommendations were highly influential due to the perceived necessity of change.

At that time, resistance to reforms and the unwillingness to accept any change was increasingly criticized by several heads of universities who denounced the German university as "rotten from the inside?" (Glotz 1996; Simon 1991) or potentially "not savable" (Daxner 1996). The authors viewed the huge increase in student numbers and overload of student capacities (as a result of higher education expansion) as a problem and described many structural problems that the universities faced at that time. The more or less common idea was that the state would have to reduce its influence in order to let creativity

[8] The introduction of the so-called democratic "group university" could be viewed as an institutional logic in itself. It played a major role in the resistance against the reforms, but will not be further examined in this paper (see Schimank 1995).

and new ideas flow (Glotz 1996, 135) – but a withdrawal of the state from the basic funding and function of protecting academic freedom was rather not intended (Daxner 1996, 194). Quality assurance, the role of the university in the public sphere and the region, transparency, and comparability of performance were important topics. In 1994, a neoliberal think tank, the Center for Higher Education (CHE), was founded which propagated extensively the model of the autonomous, competitive, and "unleashed" university.[9]

In the following years, the criticism triggered a process of theorization and the implementation of a series of reform measures and new regulations. The fourth amendment of the German Higher Education Framework Act in 1998 included the devolution of power from the national government to the federal states (Kühler 2005, 266-70) which started to evaluate their higher education systems, set up planning commissions, and compiled strategic plans for the future.[10] These plans and papers dealt with the efficiency of the higher education system in the focal national government, e.g. the underutilization of capacities for students and the introduction of NPM-instruments. All federal state governments reformed their university law which in most cases led to a reduction of academic self-governance and increasing power of university presidents and university councils (Hüther 2010).

But more importantly, the Council of Science and Humanities strengthened its role as an evaluator of higher education and research. By the end of the 1990s, the Council was commissioned to conduct so-called system evaluations of the Leibniz Society and the Helmholtz Society. In addition, an international commission led by Prof. Richard Brook, the Chief Executive of the British Engineering and Physical Sciences Research Council (EPSRC), also evaluated the German Research Foundation and the Max-Planck-Society. Both commissions criticized the low level of cooperation between the different domains of extra-university research organizations and universities and recommended more competition and cooperation (Hohn 2005, 14).

Critique of Big Science (1990s)

The nuclear research centers have also been increasingly criticized ever since the 1980s. The nuclear accidents in Harrisburg (1979) and Chernobyl (1986) along with the emerging environmental movement condemned research in nuclear energy heavily, attacked the projective vision of the "nuclear age," and destroyed the trust in the professional authority of the nuclear research centers (Weingart 1979, 15). After years of debate, the national government decided to step out of the fast breeder technology in 1991. This decision meant a profound break for the Research Center Karlsruhe. Besides, policy makers and especially

[9] <http://www.che.de/cms/?getObject=1082&getLang=de> (Accessed August 24, 2017).
[10] <http://www.hof.uni-halle.de/steuerung/struktur.htm> (Accessed August 24, 2017).

engineering companies criticized the enormous amount of resources given to the big science research institutes. The measure of evaluation, here, was economic interest rather than environmental protection (as in the first case). The so-called "Weule-Commission," an expert group of industry representatives set up by the Federal Ministry of Research in 1993, recommended to expand the level of applied research within the big science institutes up to 70% and included the hidden recommendation of closing the nuclear research centers in Jülich and Karlsruhe (Helling-Moegen 2009, 102).[11] The former president of the Research Center Karlsruhe, Manfred Popp, asserted in 2007 that the center was attacked from several sides: industrial associations and companies and the press were asking

> why the research that is done at the center could not be done at a university, why there is no competition between the research centers, and why big science besides the Max-Planck-Society and the Fraunhofer-Society should be necessary. (Popp October 22, 2007, own translation)

This criticism was expressed over a period of several years. It increasingly legitimated the initiation of a process of organizational change and reform. Firstly, the former *Nuclear* Center Karlsruhe was renamed in "Research Center Karlsruhe" in 1995. The center had to diversify its research topics (Forschungszentrum Karlsruhe 2006, 65). The new research fields included new topics which were developed on the basis of the former nuclear energy research: micro systems technology, nanotechnology, earth and environment, meteorology and climate, energy and genetics (Forschungszentrum Karlsruhe 2006, 98). Secondly, the Helmholtz-Society (HGF) was founded as an associational umbrella organization that aimed at promoting the common objectives of the big science research institutes: pursuing long-term research goals of state and society, combining basic research with problem-oriented research, resolving societally pressing questions, and ensuring the future of society. Thirdly, in the late 1990s, the Federal Ministry of Education developed the idea of a competitive program-based funding structure for the Helmholtz Institutes. This structure was developed in order to overcome their pillarization and initiate competition (Helling-Moegen 2009). The decision as to whether an institute gets funded (for a period of five years) in one of the initially eight funding schemes is now made by evaluation panels organized by the Helmholtz Society (Hohn 2010, 467).

As a result of this process, the former nuclear research centers became more similar to universities and developed intensified research collaborations with the latter. Already back in the 1950s, the Technical University of Karlsruhe and the Nuclear Research Center had formed ties within the Institute of Nuclear Process Technology (Neumeier 2000, 28). In addition, a major part of institute

[11] <http://www.bild-der-wissenschaft.de/bdw/bdwlive/heftarchiv/index2.php?object_id=10092084> (Accessed June 30, 2017).

leaders were appointed together with the University of Karlsruhe. These institutional collaborations were extended with the establishment of a collaborative Institute for Nanotechnology (INT) in 1998. Many interview partners described this cooperation as "path-breaking" for the later establishment of the KIT because they realized that research can become successful when different research institutes work together (Fenske 2009, 88).

> Within a very short period of time, Karlsruhe reached a leading position in the national field of nanotechnology and this shows what can be possible when forces are joined, and insofar this might be a good example. (Interview 01, own translation)

Besides that, the joint institute for nanotechnology was organized less hierarchically than the other institutes of the Research Center (Interview 03).

> The INT has twelve professors who are all organized in research groups. There is not the one big boss of the INT, and they all work together. That is a completely different spirit of work. And on the other hand, you cannot say, we will do this and that for five years and no one will do anything else. The other institutes can do that because they have the boss. (Interview 04, own translation)

Most interview partners describe the organization of research at the Research Center Karlsruhe as more hierarchically structured and filled by a "spirit of planning" (Meier 2017). Nevertheless, this had been criticized by different scientists also within the Research Center who mostly argue that research is somehow difficult to plan (Interview 02). This critique indicates that the organizational identity of "Big Science" was never fully accepted even within the Helmholtz institutes, which undermines the logic of corporatist planning.

4.3 The Institutional Logic of Organizational Competition

As an outcome of the "unsettled 1990s," academic self-administration in universities was reduced and hierarchical management strengthened. The Helmholtz institutes were increasingly put under competitive pressure. Thus, the reforms were much more guided by an institutional logic of organizational competition than the logic of corporatist planning. The orchestration of competition has been labeled with the term *quasi-market* (Le Grand 2011, 80). In this regard, competition for resources "takes place mostly not on 'real' markets but on 'quasimarkets' where performance evaluations by peers substitute the demand pull from customers" (Boer, Enders and Schimank 2007, 139). The institutionalization of competition involves the emergence of a normative order that defines the rules, participants, and chances to win (Weber 2015 [1922]). This normative order includes that universities are increasingly understood as "complete organizations" with a "well-defined identity, a *hierarchical structure* and capacity for rational action" (Seeber et al. 2014, 1450). The organization of research collaborations between industry, public research organizations, and government agencies is increasingly devoted towards universities "which play

an enhanced role in innovation in increasingly knowledge-based societies" (Etzkowitz and Leydesdorff 2000, 109) and therefore have a *third mission* (beyond teaching and research). Instead of the state, universities develop new research perspectives and organize activities between researchers and the private sector.

With the beginning of the 2000s, world-wide university rankings emerged and defined the evaluative criteria for strong research universities. In this context, it became increasingly visible that German universities were not able to compete with the American and British research universities (Stanford, Harvard, Oxford, Cambridge, etc.) (Gaehtgens 2012, 14). In 2002, the former president of the Council of Science and Humanities, Max Einhäupl, claimed that "there is no single university that could compete with, for example, Harvard or Yale" and concluded that "we need a German Harvard" (Schubert, 2002, own translations). This perception implied that science policy makers turned away from the former egalitarian model of the university that had shaped the higher education landscape in Germany for many years (Strohschneider 2009). In January 2004, the Social Democratic Party (SPD) resolved upon a paper called "Weimarer Leitlinien Innovation" in which it was stated that the German higher education system should be changed in order to create international top universities able to compete with Harvard or Stanford (SPD 2004, 5).

This paper was the ideational foundation of the German Excellence Initiative which was decided upon in July 2005 by the so-called joint conference of the national government and the federal states (*Bund-Länder-Konferenz*) and subsequently implemented by the German Research Foundation and the Council of Science and Humanities (Strohschneider 2009, 14). The initiative consisted of three funding lines 1) graduate schools, 2) excellence clusters, and 3) a concept for the future. The third funding line addresses (for the first time in Germany) organizations and their leadership and not individual researchers or research teams. Universities are asked to identify their strength and weaknesses, develop long-term goals and a concept of how to reach these goals (Deutsche Forschungsgemeinschaft and Wissenschaftsrat 2005). The aim is that German universities become internationally visible (in terms of their positions in international rankings). Therefore, universities should become strategic actors that are able and competent to set their long-term goals and compete on academic markets (Hasse and Krücken 2013).

The role model of this new institutional logic is the American Research University that seems to be highly successful in the competition for funding and students. The entrepreneurial university is seen as a strategic actor managing the relationship with its environment in a self-autonomous manner. It is also considered to be more adaptable to competitive pressures (Clark 1998, 5). In many ways, the technical universities resembled the entrepreneurial university model more than the traditional comprehensive universities in Germany.

Typically, technical universities are characterized by a discipline-specific higher level of third party funding in the engineering sciences, a traditionally higher degree of collaborations with the industry that leads to the building of start-ups in the periphery of the university and a higher acceptance of hierarchical leadership.[12] The role model for the entrepreneurial university is the Massachusetts Institute of Technology (MIT) that was formed in 1861 as a "science-based university committed to the industrial development of the region" (Etzkowitz 2002, 2). Etzkowitz argues that, at MIT, an entrepreneurial university model was developed. It was subsequently transferred to Stanford University and then spread throughout the academic world.

5. The Formation of KIT (2005-2009)

The excellence initiative created a *competitive situation* in which the management of the University of Karlsruhe perceived an expectation for change on the side of science policy that asked for new ideas, especially in terms of structural and organizational change.

> Firstly, there was a call for new ideas and new structures. It was a completely new situation in Germany. There is no example for the third funding line. And then, of course, the willingness for change, or let's say: the drive to enforce changes, this became quite high. (Interview 01, own translation)

The responsibility to drive organizational and structural changes was thus devolved from the political level of science policy makers to the organizational level of university managers. The latter viewed this situation as an opportunity for the mobilization of resources in which the universities mutually observed each other (White 1981, 518). The management of the University of Karlsruhe began to evaluate and critically reflect their chances of winning this competition. They came to the conclusion that it would be difficult to beat other technical universities that were selected after the first round, such as the Technical University of Munich and the Technical University of Aachen.

> The competition was mostly seen with the technical universities, and because Aachen and TU Munich were still in the running, the judgement was that it would not suffice to win, especially against Aachen. Munich – we thought – would be easier to beat.

The quote shows that the Excellence Initiative has created a situation in which the universities had to reflect their strengths and weaknesses in comparison to other (comparable) universities. Due to the perception of a high degree of

[12] In 2006, the TU9 ("TU 9 German Institutes of Technology e.V.") was founded, an association of the nine big and prestigious Technical Universities in Germany. University of Karlsruhe was a founding member of that group. The term "Institute of Technology" is analogous to the American Institutes of Technology, e.g. Massachusetts, Georgia, or California.

"willingness for change" – that was especially suggested by the third funding line and was also enforced through some comments of the reviewers (of the preliminary application) – the management was trying to find a "unique selling point" (Hartmann 2013, 70) that could convince the evaluators of the Excellence Initiative. In this process of reflection and comparison, the idea of a merger came up, which had originally been formulated in the course of a review process of the Research Center Karlsruhe. The idea to form the KIT thus had several sources: the close collaboration with the Research Center Karlsruhe, a recommendation of an expert group that had evaluated the research center and the role model of the entrepreneurial university *per se*: the MIT.

The *projective vision of the KIT* created some enthusiasm in the management team. The idea of "making KIT" inspired the management team because it offered the possibility to overcome various problems of the system, notably the *high degree of "pillarization" between universities and non-university research organizations*. The temporal orientation towards the future had unleashed imaginative capacities and opened-up the opportunity to promote a new organizational model for a German university: the KIT "as the dedicated instrument to join the league of world-leading technical universities" (Universität Karlsruhe 2006). The new model was theorized in the "concept for the future" that had to be submitted about two months after the idea of KIT came up. The management of the research center was not involved in this process, but supported it (Interview 02). The KIT has been mostly "theorized" (see above) as a solution for the low performance of the German system. The causes identified for the low performance are 1) the high degree of dependency of young researchers, 2) the low degree of organizational autonomy, 3) the low percentage of women in natural and technical sciences, and 4) the problem of pillarization. In order to overcome these weaknesses, a bundle of measures and instruments were suggested, including a new organizational structure for research which was designed to organize the merger with the research center.

> These research matrices are the basis for the new research oriented organizational structures as opposed to the current departments which are responsible for undergraduate teaching and consecutive bachelor-master programs. The integration of research at our university and research at the FZK (the latter being organized in research programs) is accomplished in the frame of these research matrices. (Universität Karlsruhe 2006, 2)

The new research structure has been inspired by the idea of inter- and transdisciplinarity – a core issue in the mode 1 and mode 2 debate (Gibbons et al. 1994). The existing disciplinary boundaries were dissolved (in terms of research activities, not for teaching). In addition, the establishment of new joint research institutes was planned. Similar to other German universities participating in the Excellence Initiative, the university started a process of building "profiles" and defining core areas of research (Meier and Schimank 2010).

In October 2005, it turned out that the University of Karlsruhe had won the competition. In the following step, the negotiation process for the merger start-

ed. The temporal orientation now switched into the pragmatic mode of action: Many veto players were involved (federal ministry, ministry of Baden-Württemberg, Helmholtz Society, and both merging organizations) who had to find a way to make this merger work and to reorder the competencies that were formerly structured by the "old logic" of corporatist planning. Resistance against the merger thus did not come from the professors and researchers of both organizations, but from political actors involved:

> There were attempts to stop the whole process, also from the highest level, but it was too late. And because the non-German evaluators in particular said, do it, this is good. And gradually, the opinion changed. So… resistance was massive, not so much from the federal state, but from the national government. Resistance is not the right expression. This was war, also with the Helmholtz Society […]. (Interview 02, own translation)

The outcome of this first negotiation phase was a position paper written by the university management and the research center. The Helmholtz Society and the ministries were also involved. Briefly summarized, the Federal Ministry of Education and Research (the major funder of the Research Center) claimed that the identity of the Research Center with a strong focus on energy research should be strengthened in the newly founded KIT-structure. In the following months, a new concept for the KIT was developed. A parallel organizational structure was set up in order to formulate a concept that built a compromise between the two research types (program-based big science and university research). The major difference between both categories was the degree of freedom that researchers have in terms of choosing a research line:

> … the president, sure, he is the president of the university, but he does not really have a say because he has nothing to distribute […]. The 170 professors over there, or 150, are fully free people. The Research Center, on the other hand has a lot more resources, no doubt, notably more professors and permanent employees. They are good scientists, a good research infrastructure, but the research center works on five-years-plans […]. That means we have to make a plan for five years […], and we are in competition with other such plans within the Helmholtz Society. (Interview 02)

Therefore, the concept team developed three types of research structures that were added to the already existing department and chairs (on the side of the university) and the institutes and programs (on the side of the research center): "*competence portfolio,*" "*centers,*" and "*focuses*" (Pruisken 2014, chapter 7.3.3) (Table 1).

Table 1: New Research Structures at the KIT

	Competence Portfolio	Centers	Focuses
Governance	Academic self-governance: Voluntary participation Spokesperson is elected	Top-down planning: Topics selected by management	Top-down planning: Topics selected by management
Funding	Start-up-funds for new projects (based on research proposals by individual researchers and intra-organizational peer review)	Existing projects are assigned to the center Start-up-funds for new projects (selection is based on organizations interests) Bureaucratic structure	Existing projects are assigned to the center Start-up-funds for new projects (selection is based on organizations interests) Bureaucratic structure
Temporal orientation	Short-term	Long-term (ten years or more)	Mid-term (five to ten years)
Size	Depends on voluntary participation of researchers	Big, 200 to 800 members	Smaller than the centers

Source: Own compilation, based on documents and interviews.

The "competence portfolio" reflects the identity of the university, whereas the "centers" and "focuses" mirror the identity of big science and the Helmholtz Society. However, the existing research structures (departments, institutes, and programs) were not removed. Mahoney and Thelen (2010, 20) describe this kind of institutional change as *layering* which results when powerful veto players "protect the old institutions, but they cannot necessarily prevent the new ones." This is also due to the high degree of legal institutionalization of both organizations. The newly founded KIT is a complex structure that includes an appropriate legal act which had to be designed within the process. The problem of pillarization now shifts to the organizational level. The KIT has to balance the plural claims and expectations of the Helmholtz Society, the national government, the government of the federal state of Baden-Württemberg, and several funding agencies (as well as the students and the civil society). To this end, the administrative management structures of the organization are strengthened. In the merger process, the KIT is constructed as an organizational actor with a mission and goals, formalized structures, and the overall aim to strengthen cooperation between the different domains of the German science system.[13]

[13] This goal is even codified in the KIT legal act: <http://www.landesrecht-bw.de/jportal/?quelle=jlink&query=KITG+BW&psml=bsbawueprod.psml&max=true> (Accessed September 8, 2017).

6. Conclusion

The aim of this paper was to show how changing institutional logics led to the formation of the Karlsruhe Institute of Technology, a merger of the University of Karlsruhe and the Research Center Karlsruhe. After World War II, the institutional logic of corporatist planning emerged. In order to strengthen the German higher education and science system in an international comparison, negotiation systems (Council of Science and Humanities, *Bund-Länderkommission*) were founded to plan the organization of higher education expansion and research. In the next step, German Reunification involved a restructuring of the German higher education and science landscape. Although the process of reunification itself did not lead to reforms, the Council of Science and Humanities in its evaluative function and evaluations as a tool in itself were enforced. In addition, the critical discourse in the 1990s provided new evaluative criteria for governance reforms. The focus shifted towards universities that were seen increasingly in competition with each other. Therefore, performance and quality criteria were discussed that reflect the differences between universities. By the end of the 1990s, the German federal states reformed their laws and strengthened hierarchical management at the universities.

With the decline of nuclear research and the demise of the Fast-Breeder-Technology, the Nuclear Center Karlsruhe faced a crisis that led to an alignment of the Research Center and to closer collaboration with the University of Karlsruhe. The "Big-Science" research institutes responded to the critique and founded the Helmholtz Society. In addition, the system evaluations that were performed by the Council of Science and Humanities led to a restructuring of the funding structures within the Helmholtz Society and aimed at expanding competitive structures between the research institutes. Finally, based on a joint initiative of the German Research Foundation and the Council of Science and Humanities, the Excellence Initiative created a situation of organizational competition in which the universities observed each other mutually.

Within this competitive environment, the management of both the University of Karlsruhe and the Research Center Karlsruhe gave rise to the idea of the KIT. This organizational transformation can be explained by the preceding sequences: a strong critique of the Research Center, an increasing alignment of both organizations, the role model of the entrepreneurial university, and claims to overcome the high segmentation of the system. After Karlsruhe had become one of the winners of the Excellence Initiative, action shifted from a projective mode of theorization to a pragmatic mode of negotiation and conflict. The new organization had to balance the claims of various actors involved because the "old" logic of corporatist planning was still institutionalized; especially the national government and the Helmholtz Society did not want to lose their influence.

The emergence of a new institutional logic is a dynamic process in which critique plays an important role. In the *projective mode* of critique rationality criteria for a new order are formulated by relating specific problems and solutions. In the merger case of the KIT, a high degree of pillarization and state control was criticized. The new model of the American Research University was presented as a solution. The role model of the entrepreneurial university performs basic *and* applied research in one organization. It also competes for funding with other entrepreneurial universities. Following this model, the KIT embraces different former research types in one organization. Management structures are set up in order to coordinate and intensify cooperation between research groups. The rules of acceptability for the new model have to be tested and proven in *the pragmatic mode* of critique. As suggested by Boltanski and Thevenot, the result is a compromise which is (in this case) characterized by *layering* (Mahoney and Thelen 2010) because old and new organizational elements prevail.

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